CHAPTER-V

Human Resource Development, Infrastructure, Agricultural Productivity and Agricultural Wages.

Agriculture, as asserted earlier, is the mainstay of the life of the people in the state, providing employment to the largest number of the working population and contributing about two third to the state domestic product. Increasing agricultural productivity is, thus, the essential need for enriching the life of the people in the state. Agricultural productivity has been observed (in Chapter II) to have a positive associationship with the level of human resource development and available infrastructure facilities. In the present chapter, we propose to examine the contributions of human resource development and available infrastructure facilities, among other factors, to agricultural productivity. Further, an increase in agricultural productivity will be reflected in the upward movement of agricultural wage rate.[1] Therefore, it logically follows that level of human resource development and available infrastructure facilities will be positively associated with agricultural wage rate. Thus, the present chapter proposes to assess the impact of human resource development and available infrastructure facilities on agricultural wage rate. The chapter is, therefore, presented in three sections, the first and second

1. Kothari, V.N. Movement of Wage Rates in India, Bombay University Press, Bombay, 1976, p.18-21.

sections determine the contributions of human resource development and available infrastructure facilities to agricultural productivity in the state and in the sample districts respectively and the third section, examines the impact of the two explanatory variables on agricultural wage rate in the state.

Agricultural Productivity in the State

The present section uses agricultural productivity for each of the 13 districts of the state. Gross value of agricultural output, as worked out in Chapter II, is used in determining agricultural productivity per hectare of cultivated area (land productivity) and per farm worker (labour productivity). Land and labour productivity, thus obtained, for the years, 1973 and 1981 for each of the 13 districts are presented in Table V -1. The table also provides the rank assigned to each district (in descending order) in regard to agricultural productivity.

The table indicates that land productivity (agricultural productivity per hectare) varies from Rs. 1348 to Rs. 710 in 1973 and from Rs. 1736 to Rs. 813 in 1981, among the districts. The districts viz., Cuttack, Puri, Ganjam and Sambalpur are found to have high land productivity (lying above state average) in both the years. While Dhenkanal district is seen to have high land productivity

Table V - 1 1

Agricultural Productivity for the Districts in Orissa-State in 1973 and 1981, at 1971 Prices(Constant).

Sl No.	Districts	Land productivity in Rs.per hectare.		Labour productivity in Rs. per hectare.	
		1973	1981	1973	1981
1	2	3	4	5	6
1.	Balasore	926 (6)	1331 (4)	919 (9.5)	1180 (6)
2.	Bolangir	855 (8)	1138 (7)	937 (8)	1184 (4.5)
3.	Cuttack	1294 (2)	1736 (1)	1176 (4)	1399 (1)
4.	Dhenkanal	1091 (5)	1045 (9)	1926 (1)	1146 (9)
5.	Ganjam	1169 (3)	1620 (2)	944 (7)	1176 (7)
6.	Kalahandi	877 (7)	951 (11)	1174 (5)	1175 (8)
7.	Keonjhar	839 (10)	813 (13)	919 (9.5)	881 (13)
8.	Koraput	734 (12)	982 (10)	894 (11)	1070 (10)
9.	Mayurbhanja	849 (9)	1073 (8)	840 (12)	922 (12)
10.	Phulabani	710 (13)	1189 (6)	702 (13)	1184 (4.5)
11.	Puri	1348 (1)	1445 (3)	1285 (3)	1203 (3)
12.	Sambalpur	1160 (4)	1304 (5)	1339 (2)	1338 (2)
13.	Sundergarh	778 (11)	944 (12)	989 (6)	1069 (11)
14.	State	972	1198	1080	1148
15.	C.V. (%)	21	22	27	11

Source: Bureau of Statistics and Economics, Orissa, Statistical Abstract of Orissa, 1973 and 1979, Directorate of Agriculture and Food Production Orissa, Agricultural Statistics, 1981.

in 1973, Balasore is found to have the same in 1981. It appears from the table that the relative position of the districts in this regard remains unaltered from 1973 to 1981. The rank correlation coefficient is worked out to be +.70 which is positive and significant. Further, it is interesting to note that land productivity of the agriculturally advanced districts appears to be rising a little faster than that of the remaining districts, since the coefficient of variation is seen to have increased from 1973 to 1981 (row 15 in Table). Does it imply that their high level of human resource development and available infrastructure facilities are able to cause such phenomenon? The agriculturally advanced districts (with high land productivity) are observed to be associated with high level of human resource development and available infrastructure facilities which are expected to have not only positive but also significant contribution to cause such phenomenon.

The observation is more interesting in regard to per farm worker agricultural productivity, i.e., labour productivity. Although the districts with high land productivity are generally the districts with high labour productivity (except Ganjam in 1973), there are some new additions to the list such as Kalahandi (in both the years), Bolangir and Phulbani (in 1981). The most interesting

phenomenon is that in regard to labour productivity, the relative position of the districts between 1973 to 1981 does not appear to remain unchanged, since the rank correlation coefficient calculated is found to be +.42 (which is not significant). Moreover, the decline in the coefficient of variation from 27% in 1973 to 11% in 1981 shows that there is a tendency for even distribution of labour productivity among the districts.

Factors Affecting Agricultural Productivity in Orissa-State:

Several factors are responsible in affecting agricultural productivity in a given region. Factor contributions to agricultural productivity are also different in different regions. The contributions of different factors to agricultural productivity are assessed by pursuing regression analysis. Two separate regressions are run- one, with land productivity and the other, with labour productivity as dependent variable by using the follwoing specified explanatory variables. The variable specified are given below:

A. Dependent Variables:

i) Agricultural productivity per hectare of cropped area, (Y_L).

ii) Agricultural productivity per farm-workers, (Y_W).

B. Explanatory Variables:

i) Cropping intensity, i.e., gross cropped area as percentage of net area sown (X_1)

ii) Area under crops other than food crops as percentage of total cropped area (X_2).

iii) Area under H.Y.V. Paddy as percentage of total area under paddy (X_3).

iv) Number of bullocks used for work per 100 hectares of net area sown (X_4).

v) Number of tractors per lakh hectares of net area sown (X_5).

vi) Number of pumpset and oil engines per 10,000 hectares of gross irrigated area (X_6).

vii) Net irrigated area as percentage of net area sown (X_7).

viii) Average size of operational land holdings (X_8). (in hectare).

ix) Number of ploughs per 100 hectares of net sown area (X_9).

x) Annual average rainfall (X_{10}) (in C.M.).

xi) Number of agricultural workers per 100 hectares of net area sown (X_{11}).

xii) Rural literacy percentage (X_{12}).

xiii) Index of human resource development (X_{13}).

xiv) Index of available infrastructure facilities (X_{14}).

A brief account of the logic for the selection of the variables are detailed below. The factor contribution to agricultural production will be reflected in the variation in agricultural productivity and therefore, land and labour productivity are chosen as dependent variables. Cropping

intensity signifies multiple cropping, i.e., sowing a plot of land more than once. Thus, higher cropping intensity implies higher level of agricultural production. The area under crops other than food crops is a proxy measure of cropping pattern. A high percentage of area under these crops implies a high percentage of area under high valued crops and hence, high level of agricultural productivity. Bullock power is the most important source of energy in conducting agricultural operation in the state. In the absence of actual utilization of bullock power, the density of bullock power has been used as proxy. The higher is the level of utilization of bullock power, the more effective are agricultural operations and hence, high level of agricultural productivyt. Mechanical power like the use of tractor conducts agricultural operations more effectively and reduces cost of production and thus raises agricultural productivity. Pumpsets and oil engines are instrumental for increasing private source of irrigation which is more assured and dependable and therefore, facilitate technological breathrough in agriculture and multiple cropping and raise agricultural productivity. The yield raising character of irrigated agriculture (as pointed out earlier) needs no further elaboration. Large size of operational land

holdings facilitate scale economics and raise agricultural productivity. However, several studies[2] have established inverse relationship between farm size and agricultural output. Optimum utilization of available resources in the small farm holdings makes them efficient production units and thereby raising agricultural productivity. Moreover, the recent introduction of H.Y.V. seed technology without mechanisation is highly labour intensive in character. The large farms depending mainly on hired labour may be averse to introducing such technology and raise production. But the small farm holdings, with the use of farm family labour on the other hand, are more prone to introduce such technology and raise agricultural productivity. Agricultural operations are carried out through several tools, implements, and machineries. Plough is the basic implement and ploughing entails a large portion of time and energy in farming operations in the country, since agricultural production depends on the effective tilling in the land. Rainfall is the natural source of water supply. Adequate rain fall ensures a high level of agricultural production and its insufficiency or excessiveness is counter-productive. A relatively large

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2. i) Long, Erven, J., "The Economic Basis of land Reform in under-developed countries", Land Economics, Vol.37 (2) March 1961 p.-113-123.
   ii) Sen, A.K. -"Size holdings and Productivity", "The Economic Weekly, Vol.16, p. 323-326.
   iii) Khusro, A.M. "Returns to Scale in Indian Agriculture", I.J.A.E., Vol.19, Oct.-Dec., 1964, p.51-88.
   iv) Rao, C.H.H. "Alternative Explanations of the Inverse Relationship between Farm size and Output per hectare, in India", The Indian Economic Review, Vol.Oct.1961, p.1-12.
   v) Sharma, P.S. "Impact of Farmsize on Agricultural Productivity in India - A Cross Sectional Analysis", Agricultural Situation in India, Nov. 1971, p.543-551.

number of agricultural workers available per hectare of cropped area promote intensive utilization of land other available resources[3] and raise agricultural productivity per land unit. However, the causation underlying the phenomenon in open to alternative interpretation. But manland ratio beyond certain technological limit is dampening for labour productivity. The effects of human resource development and available infrastructure facilities have been discussed in Chapter II.

Several studies[4] have been conducted by using some of these and other variables to identify input factor's contributions to agricultural productivity by using cross section data. However, in the present Study, the level of human resource development and available infrastructure facilities, among others, are emphasized to account for the variations in agricultural productivity. Irrigation - an indicator of infrastructure facilities and rural literacy, one of the indicators of human development are used separately because of their relative importance in affecting agricultural development.

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3. Alagh, Y.K. and Bhalla, G.S., "Agricultural and Manpower Absorption in India", in ILO, A.E.T.E.P., publication Nov. 1978, p. 119.

4. i. Bhalla, G.S. and Alagh, Y.K., Performance of Indian Agriculture - A Districtwise Study, Sterling Publishers, New Delhi 1979, p. 136.
   ii. Sharma, P.S. "Impact of Selected Aspects of Labour and Land on Agricultural Productivity", IJAE, Vol.21(1), Jan.-March 1966, p. p. 31-41.
   iii. Singh Baldev, Productivity and Resource Structure. A Case Study of Agricultural Development in Gujarat". IJAE, Vol. 35(3), July-Sept. 1980, p. 34-50.
   iv. Ranade, C.G. 'Impact of Cropping Pattern in Agricultural Production, IJAE, Vol.XXXV(2), April-June, 1980, p.85-.93.

The data relating to the selected variables are presented in Appendix Table V-1. and V-2 for the years, 1973 and 1981, respectively. The obvious limitation in the use of the data is that due to nonavailability of data, some of the selected variables relate to the nearest years rather than to the concerned year. However, this will not fail to give a broad idea about the factor accountability to the variation in agricultural productivity.

Interrelationship among the Selected Variables:

Before going to regression analysis, it will not be inappropriate to examine the inter-correlation among the selected variables, with one another. Tables V-2 and V-3, present the correlation matrices indictating such inter-correlation for the years, 1973 and 1981, respectively. It can be seen from the tables that land productivity is positively correlated with almost all the explanatory variables in both the years with a few exceptions. Its correlation with each of cropping intensity, irrigation, rural literacy, human resource development index and infrastructure index (in both the years), and area under H.Y.V. paddy and man-land ratio (in 1981) are positive and significant. While labour productivity is positively correlated with almost each of the explanatory variables in 1981, it is positively and negatively correlated with each of them in 1973. However, almost all the correlation coefficients are non-significant in both the years, except those with each of cropping intensity, H.Y.V. area, irrigation and infrastructure index in 1981 (a) which are positive and significant.

The negative associationship of holding size with each of land and labour productivity (of which-with the former significantly) is note-worthy. It is difficult to draw anything conclusively from such relationships, because average size of operational holdings after imposition of land ceiling is largely determined by quality of the soil, nature of rainfall and irrigation facilities. It is quite reasonable to argue that in a given region with inferior soil, and inadequate rainfall and irrigation facilities, the average size of operational holdings will be larger and agricultural productivity (in terms of land or labour) will be less.

The negative (although nonsignificant) correlation of bullock with each of land (in 1981) and labour (in both the years) productivity indicate that bullock power is underutilized in the state agriculture. Though nonsignificant, the negative association of rainfall with each of land and labour productivity implies that the state's agriculture, often, is adversely affected by excessive rainfall causing flood havoc which washes away crops and thereby reducing agricultural productivity. The negative correlation between each of land (in both the years) and labour (in 1971) productivity with area under nonfood crop reflect that nonfood crops grown in the state is not high valued crops raising agricultural productivity.

The interrelationship among the explanatory variables with each other support many a possible proposition about the agriculture in the state. A few of these are mentioned

below. The positive and significant correlation of cropping intensity with each of area under H.Y.V. paddy, irrigation, manland ratio, literacy and infrastructure index in either one or both the years, implies that the latters promote multiple cropping in the state agriculture. Its negative and significant correlation with each of holding size and rainfall reflect that multiple crop culture is not practised in the regions with high average size of operational holdings for the obvious reasons cited earlier, and rainfall does not provide scope for multiple cropping. Multiple cropping requires land with a certain degree of moisture content, the excess or insufficiency of which renders land unsuitable for multiple cropping. In regard to the remaining explanatory variables, the correlation with each other are found to be mainly nonsignificant (either negative or positive). We are dealing with a few indicating intreesting relationship. The negative correlation between pumpset and irrigation implies that pumpset does not appear to raise irrigation potential. It is plausible to infer that pumpsets are installed in the regions with inadequate irrigation facilities. The irrigation potential capacity of the pumpsets is probably underutilized since the farmers in the Kariff season do not require their land to get irrigated and in the rabi seasons, the inadequate ground and surface water sources do not bring more land under irrigation. The tables further shows that farmers do not cultivate H.Y.V. paddy in rainfed land due to the anticipated loss to the relatively high

investment in H.Y.V. paddy cultivation. It logically follows from this that in the Kariff seasons, traditional crop culture prevails in the regions. The remaining intercorrelation among the explanatory variables with one another may be noticed from the tables.

Regression Model and Results of Regression:

In the present study, multiple regression analysis is avoided owing to the constraint imposed by limited number of observations. The data relate to the cross-section of 13 districts of the state which fall short of the number of explanatory variables. Therefore, each of the dependent variables is individually regressed on each of the independent variables. We have assumed a simple linear regression model given as follows:

$$Y_i = b_0 + b_1 x_i + u_i$$

Where Y is the dependent variables, X is the explanatory variable and U is the error term. The b_0 and b_1 are the intercept and regression coefficient respectively. Ordinary Least Square method is applied to estimate regression coefficient. However, a regression model of this type will not be inadequate to reflect the importance of individual variable in explaining agricultural productivity.

Results of Regression:

Land and labour productivity are separately regressed on each of the explanatory variables for the years, 1973 and 1981 by using the districtwise data for Orissa-State. The regression estimates for each of the dependent variables separately for the years, 1973 and 1981 are presented in Tables V-4 and V-5 respectively. Table V-4 indicates that factors like cropping intensity, irrigation, literacy and infrastructure index (for both the years,) and area under H.Y.V. paddy, man-land ratio and human resource development index (for 1981) are positively and significantly accounting for the variation in land productivity. These factors individually explain from 32% to 81% in 1981, and 31% to 71% in 1973 of the variation in land productivity. Further it may be seen from the table that holding size on the level of land productivity is negative and significant. The reasons for such phenomenon has already been discussed in the previous section.

Table V-5 shows that none of the explanatory factors is significantly affecting labour productivity in 1973. The production coefficients of cropping intensity, area under H.Y.V.paddy, irrigation and infrastructure index in 1981 are found to be positive and significant in explaining labour productivity. These variables separately explain from 31%

Table V-4

Regression Results for Land Productivity for 1973 and 1981.

Sl. No.	Variables	1973 bo	1973 bi	1973 R^2	1981 be	1981 bi	1981 R^2
1	2	3	4	5	6	7	8
1.	Cropping Intensity (X_1)	-642.5	13.271 (5.140) ++	.706	-394.3	11.304 (4.857) ++	.682
2.	Area under crops other than food crops (X_2)	1239.8	-30.872 (-1.717)	.211	1214.6	-0.959 (-0.069)	.004
3.	Area under H.Y.V. Paddy (X_3)	832.9	16.563 (1.353)	.143	798.1	14.197 (2.285) +	.322
4.	Bullocks for 100 hectares of N.S.A. (X_4)	788.7	2.263 (.372)	.021	1228.9	-0.386 (-.0.079)	.001
5.	Tractors per lakh hectares of N.S.A.(X_5)	825.8	6.442 (1.917)	.250	1168.9	0.639 (0.930)	0.073
6.	Pumpsets and Oil Engines(X_6)	1048.2	-1.025 (-1.063)	.093	1179.1	.212 (.305)	0.008
7.	Net Irrigated area (X_7)	826.8	15.287 (2.569) +	.319	790.3	23.332 (6.921) ++	.812
8.	Holding Size(X_8)	1334.1	-168.372 (-3.292) ++	.496	1732.4	-302.178 (-2.865) +	.428
9.	Ploughs (X_9)	806.4	3.302 (.815)	.057	811.6	6.614 (1.698)	.208
10.	Annual Average Rainfall (X_{10})	1148.2	-1.305 (508)	.023	2508.4	-8.719 (-1.145)	.106
11.	Manland Ratio(X_{11})	327.2	6.848 (1.764)	.220	26.1	10.378 (3.357) ++	.506
12.	Rural Literacy (X_{12})	526.5	20.011 (3.744) ++	.560	667.6	18.186 (2.660) ++	.392
13.	Human Resource Development Index (X_{13})	420.4	5.464 (2.129)	.292	187.2	10.052 (2.452) +	.353
14.	Infrastructure Index (X_{14})	466.5	5.017 (2.271) +	.319	662.1	5.819 (2.946) +	0.441

++ Significant at 1% level
+ Significant at 5% level
N.B.:- Figures in Parentheses are t-values.

Table V-5:

Regression results for labour Productivity in 1973 & 1981

Sl No.	Variables	1973 b_0	1973 b_1	1973 R^2	1981 b_0	1981 b_1	1981 R^2
1.	Cropping Intensity (X_1)	340.1	6.084 (.908)	.070	493.4	4.650 (2.934)	439
2.	Area under crop other than food crops (X_2)	1140.2	-6.889 (-.234)	.009	1090.1	3.294 (0.471)	0.019
3.	Area under H.Y.V. paddy (X_3)	1004.2	(10.205) (.4777)	.020	946.0	7.181+ (2.240)	.313
4.	Bullocks per 100 hectares of N.A.S. (X_4)	1730.2	-8.046 (-.938)	.074	1308.8	-1.986 (-.825)	.058
5.	Tractors per lakh hectares of N.A.S. (X_5)	967.1	9.005 (.917)	.071	1139.7	0.189 (.523)	9.24
6.	Pumpsets and Oil Engines per 10,000 hectares of gross irrigated area (X_6)	1151.9	-0.957 (-0.661)	.038	1135.8	0.141 (.0.396)	0.014
7.	Net irrigated area (X_7)	1063.1	1.814 (.153)	.002	987.7	9.191++ (3.187)	.480
8.	Holding size (X_8)	1168.7	-14.024 (0.134)	.014	1273.2	-70.642 (1.036)	0.89
9.	Ploughs per 100 hectare of N.S.A. (X_9)	1349.8	-5.390 (-.919)	0.071	990.2	2.707 (1.296)	0.132
10.	Average Annual Rainfall (X_{10})	1278.3	-1.461 (-0.389)	0.013	1817.2	-4.450 (-.139)	.105
1.	Man-land Ratio (X_{11})	1761.9	-7.246 (-1.201)	.116	911.2	2.098 (.969)	0.079
2.	Rural Literacy (X_{12})	745.9	15.041 (1.387)	.149	947.8	6.874 (1.724)	0.213
3.	Human Resource Development Index (X_{13})	947.2	1.319 (.298)	.008	822.3	3.241 (1.337)	0.140
	Infrastructure Index (X_{14})	1016.7	0.631 (.162)	.002	873.1	2.542 (2.615)	0.383

++ Significant at 1% level.
+ Significa nt at 5% level.

N.B.- Figures in parentheses are (t) values.

to 48% of the variations in labour productivity in the state agriculture. It is worthwhile to mention that while production coefficient of manland ratio is negative (as expected) in 1973, it is seen to be positive in 1981 (though non significant in both cases). The positive sign implies that the onset of agricultural transformation, however slow, is probably raising labour efficiency and the rise of labour efficiency has not been prominent enough to affect labour productivity significantly.

2. Agricultural Productivity in the Sample Districts

The present section deals with the factor accountability in the variations of agricultural productivity at the agricultural district level in the three sample districts, viz., Cuttack, Balasore and Mayurbhanja. Each of the revenue districts of the state(Orissa) is divided into two or more agricultural districts and each of the agricultural districts consists of a number of community blocks. Of the 77 C.D. blocks, 32 of Cuttack districts comprise 4 agricultural districts, viz., Athagarh, Jagalsingpur, Cuttack and Jajpur, 19 C.D.-blocks of Balasore district come under 2 agricultural districts such as, Balasore and Bhadrak and the remaining 26 of Mayurbhanja district are included in 2 agricultural districts, namely, Baripada and Karanjia.

The Directorate of Agriculture and Food Production, Government of Orissa, publishes average yield statistics not only for each of revenue districts but also for each of agricultural districts and therefore, it will not be difficult to obtain (gross) agricultural production at agricultural district level.

The underlying reasons for having this exercise is that Cuttack district is seen to be relatively more advanced agriculturally than industrially, and Balasore and Mayurbhanja are backward districts. The extent of rurality in the region comprising the three districts is expected to be more. Further, the data used in this section relate to the concerned years i.e. 1971 and 1981. The data for different blocks under each of the agricultural districts are pooled together to generate data for the respective agricultural district by following simple average technique. An exercise of this sort is expected to provide a better understanding about the factors explaining variations in agricultural productivity.

Land and Labour Productivity*:

By following the method adopted in Chapter II, the gross value of agricultural product per hectare of net sown area and per farm worker are worked out to give land and

* Due to exclusion of some crops (for which district or state level wholesale prices have not been readily available) in estimating gross value of agricultural product at the district level, there are some discrepancies in land and labour productivity.

labour productivity respectively for the years, 1971 and 1981 in each of the 8 agricultural districts. Table V-6 presents such land and labour productivity, thus obtained, for both the years. It can seen from the table that all the four agricultural districts of Cuttack in 1971 and three in 1981 are lying above the regional average of land productivity. Over the decade, the relative position of the agricultural districts in this respect does not appear to have changed. The rank correlation coefficient is worked out to be +.98 which is significant at a high level. Further the disparities among the agricultural districts in land productivity remain unchanged, because the coefficient of variation is seen to be more or less the same in both the years. In regard to labour productivity, three agricultural districts in Cuttack and one in Balasore in 1971 and all the agricultural districts of Cuttack and Balasore in 1981 are found to be above the regional average. The relative position of the agricultural districts in labour productivity, as compared to that in land productivity, appears to have undergone a little change, since the rank correlation coefficient turns out to be +.76. However, its disparities among the agricultural district are seen to be reduced as the coefficient of variation has come down from 16% in 1971 to 12% in 1981.

Thus, from the foregoing analysis, the observations

Table V-61

Agricultural district level land and labour productivity in the sample districts at 1971 prices.

Sl. No.	Agricultural District.	Land Productivity per hectare (Rs)		Labour Productivity per worker (Rs)	
		1971	1981	1971	1981
1	2	3	4	5	6
1.	Athagarh	1430 (3)	1848 (3)	1165 (3)	1295 (6)
2.	Jagatsinghpur	1504 (2)	2889 (2)	1114 (4)	1453 (2)
3.	Cuttack	1743 (1)	2260 (1)	1262 (2)	1616 (1)
4.	Jajpur	1277 (4)	1596 (5)	1000 (6)	1388 (5)
5.	Balasore	1135 (5)	1611 (4)	1027 (5)	1418 (4)
6.	Bhadrak	1116 (6)	1430 (6)	1278 (1)	1442 (3)
7.	Baripada	954 (8)	1256 (8)	739 (8)	1021 (8)
8.	Karanjia	1007 (7)	1348 (7)	892 (7)	1287 (7)
9.	Regional Average	1271	1680	1060	1365
10.	C.V. (%)	30	20	16	12

+ Land and Labour Productivity of the agricultural districts appear to be higher than these at the district level due to exclusion of some crops (for non-availability of price date) in working out gross value of agricultural productivity in the district (revenue).

SOURCES:- District Agricultural Offices (Records) Athagarh, Cuttack, Jagasinghpur, Jajpur Balasore, Bhadrak, Baripada and Karanji Directorate of Agricultural and food production, Orissa Agricultural Statics, 1971 and 1981 and Bureau of Stities and Economics Orissa.

N.B.- Figures in parentheses are ranks.

relating to land and labour productively in the sample districts as well as in the state appear to be similar. The disparities in land productively remain more or less unchanged in the sample districts and have shown a marginal rise in the state over the period.

Factors Affecting Agricultural Productivity.

In determing the factors affecting agricultural productivity simple linear regression analysis, as discussed in the previous section, has been resorted to. Land and Labour productivity at the agricultural district level are separately taken to be the dependent variables for both the years, 1971 and 1981. The independent variables selected for regression analysis are given below.

i) Net-irrigated area as percentage of net area sown (X_1).

ii) Cropping intensity, (X_2).

iii) Area under crops other than food crops as % of total cropped are - a proxy variable for cropping pattern (X_3).

iv) Area under H.Y.V. paddy as % of total area under paddy (X_4).

v) Number of agricultural workers per 100 hectares of net cropped area (X_5).

vi) Number of bullocks used for work per 100 hectares of net cropped are (X_6).

vii) Number of ploughs per 100 hectares of net cropped area (X_7).

viii) Number of pumpsets and soil engines per 10,000 hectares of gross irrigated area (X_8).

ix) Fertilizer consumption (in kg) per 10 hectares of gross cropped area (X_9).

x &xi) Number of village agricultural workers (V.A.Ws.) per 100 square K.M. of area (X_{10}) and per 10,000 cultivator (X_{11}).

xii) Rural literacy percentage (X_{12}).

xiii) Human resource development index +(X_{13}).

xiv) Infrastructure index +(X_{14}).

These variables are selected for each of the agricultural districts separately for the years, 1971 and 1981. The selection of irrigation, village agricultural workers and rural literacy separately, besides their inclusion in the respective indices is done due to their relative importance in affecting agricultural productivity. The a-priori reasons for the selection of the above explanatory variables are discussed earlier. All these variables are expected to have positive impact on agricultural productivity with the lone exception that man-land ratio will have a negative influence on labour productivity. The data relating to the selected variables for the years, 1971 and 1981, for each of the agricultural districts are given in Appendix Tables V-3 and V -4 respectively.

+ Simple average of these indices, as constructed in Chapter III, for each agricultural district is worked out and used.

Inter-relationship among the Selected Variables:

Before regressing the dependent variables separately on the explanatory variables, the interrelationship among the selected variables with one another for both the years, 1971 and 1981, are discussed briefly. The interrelationship is presented in matrix forms in Tables V-7 and V-8 for the years, 1971 and 1981 respectively. The table V-7 indicates that land productivity is positively and significantly correlated with each of irrigation, cropping intensity, area under H.Y.V. paddy, plough, chemical fertilizer, rural literacy, man-land ratio, village agricultural workers (in terms of area), human resource development index and infrastructure index in either one or both the years. Among the remaining explanatory variables all but one (V.A.W's per 10,000 cultivators in 1981) show positive correlation with it in both the years. The correlation between labour productivity and each of the explanatory variables are positive in both the years with a few exceptions. However, rural literacy in both the years, and cropping intensity, plough, fertilizer, human resource development index and infrastructure index, in 1981, are seen to be significantly correlated with it. The nonsignificant (both negative and positive) correlation between V.A.W$_s$ per 10,000 cultivators, and each of land and

Agricultural Input and Productivity Correlation Matrix (at the Agricultural District level) in 1971

	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}
X_1	1.00											
X_2	.854^{++}	1.00										
X_3	.356	.654^{+}	1.00									
X_4	.946^{++}	.939^{++}	.412	1.00								
X_5	.635	.693^{+}	.545	.323	1.00							
X_6	.777^{+}	.509	.061	.694^{+}	.686^{+}	1.00						
X_7	.727^{+}	.562	.047	.757^{+}	.272	.722^{+}	1.00					
X_8	.026	.236	.164	.172	.207	. 260	. 273	1.00				
X_9	.952^{++}	.901^{++}	. 467	.916^{++}	.690^{+}	.737^{+}	.620	.197	1.00			
X_{10}	.755^{+}	.772^{++}	.237	.887^{++}	.479	.608	.856^{++}	.183	. 664^{+}	1.00		
X_{11}	.030	.247	.281	.088	.311	.260	.042	.798^{+}	.297	-.071	1.00	
X_{12}	.570	.581	.007	.699^{+}	.058	.414	.871^{++}	.429	.526	. 848^{++}	.119	1.00
	.323	.409	.025	.513	.061	.257	.752^{+}	.229	.264	.661^{+}	. 127	.813^{++}
	.272	.407	,138	.466	.221	. 249	.612	.161	.251	.557	.235	.618
	.873^{++}	,947^{++}	.491	.945^{++}	.560	.589	.711^{+}	.388	.903^{++}	.855^{++}	.209	.753^{+}
	.479	.506	-.052	.541	-.212	.115	.614	.281	.468	.566	. 036	.857^{++}

++ Significant at 1% level.
+ Significant at 5% level.

Matrix(at the Agricultural District level) in 1981

	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}
464	1.00										
441	.525	1.00									
++	.585	.234	1.00								
9	.818++	.386	.683+	1.00							
8	-.022	.114	.140	.292	1.00						
12++	.594	.193	.623	.555	.575	1.00					
157	.552	.296	-.117	.319	-.226	-.086	1.00				
3++	,657+	.157	.826++	.649+	.285	.889+	-.206	1.00			
	.238	.167	.364	.567	.932++	.719 +	-.213	.544	1.00		
	-.329	-.216	.014	-.207	-.309	-.435	-.293	-.272	-.318	1.00	
	.601	.067	.622	.642	.620	.949++	.037	.817++	.573	-.482	1.00
54++	.500	-.024	.606	.566	.617	.965++	-.145	.869++	.602	-.344	.914++
++	.651 +	.070	.723+	.641 +	.459	.922 ++	-.096	.917 ++	.665 +	,269	.907++
++	.779 ++	.375	.829 ++	.789 ++	.431	.958 ++	.061	.915++	.635	-.407	.782++
6++	.284	.173	.547	.161	.338	.844++	-.195	.749 +	.369	-.456	.798++

++ Significant at 1% level

+ Significant at 5% level .

labour productivity as against the positive and significant correlation between V.A.Ws in terms of area, and each of the dependent variables imply that V.A.Ws in terms of cultivators are less effective than V.A.Ws. in terms of area in affecting agricultural productivity. The variations in the density of cultivators and inadequacy in transport and communication facilities render V.A.Ws. provided in terms of cultivators ineffective.

The interrelationship among the explanatory variables with one another can also be seen from the tables for both the years. Such relationships among the explanatory variables in agriculture of the state and in the region appear to be similar. Some of these relationships and their implications have already been discussed in the previous section. However, the correlation of fertilizer consumption with each of cropping intensity, irrigation, area under H.Y.V. paddy, man-land ratio, bullock/plough, V.A.Ws., (in terms of area) rural literacy, human resource development index and infrastructure index which are positive and significant in either one or both the years are really interesting. It implies that human resource development and infrastructure facilities are essential for agricultural modernization in the region. This proposition is supported by the high positive and significant correlation of area under H.Y.V. paddy with each of irrigation, V.A.Ws. (interms of area) rural literacy and infrastructure index. Further, fertilizer

consumption appears to be influenced directly by the availability bullock, plough and agricultural workers, among others, and implying, thereby that farm mechanisation has not started in thereoion. The relationship among the other explanatory variables (with each other) may be observed from the tables.

Regression Model and Results of Regression:

In order to determine the factors accounting for the variations in land and labour productivity, simple linear two variable model regression equations (one each for one dependent and independent variable) are fitted to the cross-section data of 8 agricultural districts separately for the years, 1971 and 1981. The results of regression are given in Table V-9 and V-10 for land and labour productivity respectively. The table V-9 indicates that factors like irrigation, cropping intensity, area under H.Y.V. paddy, plough, fertilizer, rural literacy in both the years, V.A.Ws. (in terms of area) in 1971 and man-land ratio, infrastructure index and human resource development index in 1981 are significantly and expectedly accounting for the variations in land productivity in the region. While the factors in 1971 explain from 50% to 90% of the variations in land productivity they explain from 61% to 96% of the variations in land productivity in 1981. In regard to labour productivity, rural literacy was the

Table V - 9:

Regression Results for Land Productivity in 1971 and 1981

Sr. No.	Variables	1971 b_0	1971 b_1	1971 R^2	1981 b_0	1981 b_1	1981 R^2
1.	2	3	4	5	6	7	8
1.	Net irrigated area (X_1)	1096.0	18.386++ (4.390)	.762	1285.7	19.616++ (3.761)	.725
2.	Cropping Intensity (X_2)	-322.9	12.325++ (7.203)	.897	-183.3	12.751+ (3.048)	.607
3.	Area under Non-food crops (X_3)	982.6	38.417 (1.379)	.251	1321.9	28.88 (.993)	.140
4.	Area under H.Y.V. paddy (X_4)	980.1	58.125++ (7.041)	.892	1063.2	20.91+ (3.635)	.687
5.	Mandland Ratio (X_5)	182.2	9.061 (1.657)	.314	-262.1	15.802+ (3.147)	.623
6.	Bullocks (X_6)	565.5	6.853 (1.783)	.346	1026.7	7.063 (1.134)	.186
7.	Ploughs (X_7)	641.7	8.074+ (2.475)	.505	905.5	8.752++ (5.394)	.817
8.	Pumpsets and oil Engines (X_8)	1040.0	55.929 (1.034)	.151	1660.4	2.904 (.150)	.003
9.	Fertilizer consumption (X_9)	988.4	16.131++ (5.548)	.815	1200.3	40.821++ (5.502)	.957
0.	Village agricultural workers per 100 Sq. Km. (X_{10})	496.1	167.0++ (4.029)	.731	523.1	167.67 (2.217)	.404
1.	VAWs per 10000 cultivators (X_{11})	548.5	63.903 (.530)	.044	2415.7	-49.048 (-1.059)	.165
2.	Rural Literacy (X_{12})	507.2	26.21+ (2.801)	.567	638.0	27.86+ (3.267)	.612
3.	Human Resource Development Index (X_{13})	570.1	40.82 (1.251)	.207	-317.1	122.52++ (4.003)	.728
4.	Infrastructure Index (X_{14})	882.6	35.49 (.949)	.131	2902	90.897++ (5.484)	.883

+Significant at level. ++Significant at 1% level.

Table V - 10:

Regression Results for Labour Productivity in 1971 and 1981

Sr. No.	Variables	1971 b_0	1971 b_1	1971 R^2	1981 b_0	1981 b_1	1981 R^2
1	2	3	4	5	6	7	8
1.	Net irrigated area. (X_1)	994.4	6.863 (1.337)	.229	1209.3	7.746 (2.376)	.486
2.	Cropping Intensity (X_2).	479.9	4.483 (1.438)	.257	921.7	3.033 (1.017)	.147
3.	Area under Non-food crops (X_3).	1038.8	2.768 (0.014)	.003	1258 .3	6.426 (.431)	.030
4.	Area under H.Y.V paddy (X_4).	946.4	22.639 (1.575)	.293	1168.4	6.664 (1.599)	.299
5.	Man-land Ratio (X_5)	779.5	-2.332 (-.167)	.045	1173.2	1.560 (.400)	0.025
6.	Bullocks (X_6)	9861	.0909 (.283)	.013	1117.7	2.674 (.879)	.114
7.	Ploughs (X_7) .	690.0	4.744 (1.907)	.377	1015.7	3.947** (3.864)	.712
8.	Pumpset and Oil Engine (X_8)	946.9	27.47 (.472)	.079	1395.1	-4.488 (-.487)	.038
9.	Fertilizer consumption (X_9)	960.2	5.682 (1.296)	.219	1172.9	16.353* (2.772)	.561
10.	VAWs per 100 sq. km. (X_{10})	679.4	79.2 (1.818)	.356	1040.2	47.068 (.973)	.136
11.	VAWs per 10,000 cultivators. (X_{11})	975.9	7.409 (.036)	.001	1762.9	-26.53 (-.736)	.208
12.	Rural literacy (X_{12})	468.6	20.291** (4.072)	.734	851.3	13.735* (3.239)	.637
13.	Human Resource Development Index. (X_{13})	526.1	31.09 (1.450)	.260	521.2	51.766* (2.742)	.500
14.	Infrastucture Index (X_{14})	86838	17.45 (.663)	.068	802.66	36.778 (2.904)	.584

* Significant at 5% level.
** Significant at 1% level.
N.B.:- Figures parentheses are t-values.

lone factor in 1971 significantly and expectedly accounting for 73% of the variations. However, in 1981, plough, fertilizer rural literacy, human resource development index and infrastructure index appear to be significant factors with expected signs by explaining from 50% to 71% of the variations in labour productivity. It is worthwhile to note that the contributions of V.A.Ws. in 1981 to land productivity after their initial impact on the adoption and diffusion of H.Y.V. seed technology in 1971 (and thereby raising land productivity) are nonsignificant. It appears as if the farmers do not depend much on V.A.Ws. for further diffusion of H.Y.V. seed technology in the region due to demonstration effects.

The foregoing analysis reveals that human resource development and infrastructure facilities are significantly contributing to the process of agricultural modernization in the region. Their nonsignificant contribution in 1971 imply that agriculture was more traditional in that year and over the decade, they, among others, have played significant role for transforming agriculture.

3. Determining the Impact of Human Resource Development and Infrastructure Facilities on Agricultural Wage Rate.

Agricultural labourers, as a class, is the most vulnerable section in our society. They are the poorest of

the poors. They do not have any material means of production. They work in agricultural sector - the least productive one in the economy and receive probably the lowest wages. The economic well-being of this section depends squarely on the level of agricultural productivity per farm worker (on demand side). Earlier, it has been observed that labour productivity in agriculture is positively influenced by human resource development and available infrastructure facilities. Logically, it is appropriate to hypothesise that agricultural wage rate will be directly associated with the level of human resource development and available infrastructure facilities. Thus, in the present section, we propose to examine the impact of human resource development and level of infrastructure facilities on agricultural wage rate.

Agricultural Wage Rate for Orissa-State:

The present study examines agricultural wage rates for the years, 1973 and 1978 for each of the 13 districts in Orissa-State. Agricultural wage rate at current prices is obtained by taking the simple average of agricultural wage rate[5] in the field and other work for male adult workers. In spite of the limitations that it ignores child and female workers and question of weighting, this practice is normally followed in arriving at agricultural wage rate[6].

5. Data on Agricultural Wage Rate are published by Bureau of statistics and Economics, Orissa in its Statistical Abstract (Annual Publication)

6. Kothari, V.N.- Movement of Wage Rates in India, Bombay Bombay University Press, Bombay, 1976, p. 3-9.

In order to obtain the real wage rate, working class consumer price index number (with 1973 = 100) published by the Bureau of Statistics and Economics is used to deflate the agricultural wage rate obtained at current prices. The working class consumer price index number is published in Orissa at two centres, viz., Cuttack representing North Orissa and Berhampur (Ganjam) covering South Orissa. A simple average of the two indices are worked out to generate a state level consumer price index number. By multiplying .72 by 1978 wage rates of the different districts at current prices, real wages for the districts are obtained. However, using cost of living index number of agricultural workers for deflating agricultural wage rates at current prices would have been better. Table V-11 shows the agricultural wage rates for 13 districts in the state for 1973 and 1978.

The table indicates that agricultural wage rate for the state is₹2.47 in 1973 and₹4.21 in 1978 at current prices and₹2.47 in 1973 and₹3.02 in 1978 at constant prices. Over the period, real wages, appear to have risen in the state. The table shows that the districts, namely, Cuttack, Dhenkanal, Ganjam, Puri, and Sambalpur are found to be have high level of agricultural wage rates in either one or both the years. The interdistrict differences are seen to have significantly declined from 1973 to 1978, as the coefficient of variation has reduced from 14% in 1973 to 7% in 1978. It is interesting

Table V-11:

Districtwise Agricultural wage rates at current and constant prices and their relatives for 1973 and 1978

Sl. No.	Districts	'Agricultural wage 'rate at current 'prices (Rs.)		Constant prices (Rs.)		Agricultural wage rate relative and the Change over		
		1973	1978	1973	1978	1973	1978	1973 to 1975
1	2	3	4	5	6	7	8	9
1.	Balasore	2.42	4.00	2.42	2.87	98 (8)	95 (10)	-5
2.	Bolangir	2.08	4.00	2.08	2.87	84 (12)	95 (10)	+11
3.	Cuttack	2.71	4.83	2.71	3.46	110 (5.5)	114 (1)	+4
4.	Dhenkanal	2.75	4.49	2.75	3.22	111 (4)	106 (3)	-4
5.	Ganjam	2.96	4.72	2.96	3.39	120 (1)	112 (2)	-8
6.	Kalahandi	2.71	3.88	2.71	2.78	110 (5.5.)	92 (13)	-18
7.	Keonjhar	2.21	4.22.	2.21	3.03	89 (10.5)	100 (7)	+11
8.	Koraput	2.21	4.00	2.21	2.87	89 (10.5)	95 (10)	+6
9.	Mayurbhanja	1.64	4.00	1.64	2.87	66 (13)	95 (10)	+29
10.	Phulabani	2.52	4.00	2.52	2.87	102 (7)	95 (10)	-7
11.	Puri	2.84	4.35	2.84	3.12	115 (2)	103 (4)	-12
12.	Sambalpur	2.79	4.14	2.79	2.97	113 (3)	98 (5.5)	-15
13.	Sundargarh	2.33	4.13	2.33	2.96	94 (9)	98 (5.5)	+4
14.	State	2.47	4.21	2.47	3.02	100	100	-
15.	C.V. (%)			14	7			

Source: Bureau of Statistics and Economics, Orissa, Statistical Abstract of Orissa- 1973 and 1979.

N.B.: - Figures in Parantheses are Ranks.

to note that the real wage rates for a number of districts are tugged at the lowest level of Rs.2.87 barring the district, Kalahandi in 1978. This indicates that due to the enforcement of minimum wage legislation, quoting wage rates below the statutory minimum appears to have not been relished by the concerned authority. Conclusions elicited by applying quantitative methods to such data would be of doubteful validity.

The table, further indicates that the districts with high wage rates have witnessed a relative decline in them over the period. The agricultural wage rate relatives for each of the 13 districts and their change for the respective districts over 1973 to 1978 are indicative of the phenomenon. It implies that the rate of rise of wage rates in the low wage rate districts is higher than the high wage rate districts. It has been observed in the previous sections that interdistrict variations in labour productivity in agriculture from 1971 to 1981 are gradually declining and thereby, gradually equalising wage rates among the districts. However, it would be better to determine the factors accounting for the variations in agricultural wage rates than to deduce any further conclusion.

Causes for Wages Variations:

Under neo-classical frame-work, the interdistrict wage differentials can be explained through the forces of demand for and supply of labour[7]. On the demand side marginal productivity of labour influences wage rate. The higher is the marginal productivity of labour, the higher is the wage rate. However, in the present study, agricultural productivity per farm worker[8] (worked out in Chapter II) for each district has been used as proxy for marginal productivity of labour. Another important factor in the demand side, namely, the monopsony power of the farmers which influences wage rate inversely has not been taken into account. On the supply side, the number of agricultural labourers per 100 hectares of gross cropped area in each of the district are taken to determine the supply of labour. Wage rate is inversely related to the supply of labour. Further, the people belonging to the scheduled castes and scheduled tribes work generally as agricultural labourers. They are illiterates and do not have broad communication media for knowing prevailing wage rates. Therefore, they are expected to be [illegible] exploited and discriminated in wage payment. The data relating to these above variables are given in Appen-dix table V-5. for each of the districts.

To understand the influence of the casuative factors on agricultural wate rate correlation coefficients are worked out for agricultural wages on the one hand and each of labour productivity, supply of agricultural labourers, and the

7. Kothari, V.N. Op., cit., P. 20-21.
8. Ibid. P. 20.

percentage of population in backward communities+ on the other. This has been done for the years, 1973 and 1978. With respect to the three factors, the coefficient of correlation are obtained to be +.508, +.024 and -.96 in 1973 and +.352-.005 and -.62 in 1978. The results indicate that labour productivity has positive influence on agricultural wage rate. However the correlation coefficients are not significant. There is a high degree of probability of the agricultural labourers in backward communities being exploited (since the correlation coefficient are negative and significant). The relationship shown between the supply of labour and wage rate is interesting. Surprisingly, they show positive associationship in 1973, although in 1978 their relationship is negative as expected. However, in both the years, the relationship is nonsignificant. The positive relationship in 1973 indicates that agricultural labourers have been moved from low wage to high wage districts. Interdistrict migration of labour in a state is more quick and frequent. This phenomenon has probably occured due to the adoption of the H.Y.V. seed technology which has begun during early seventies in the state. It has been observed in Chapter II that the high wage rate districts like Cuttack, Sambalpur, Ganjam, and Dhenkanal are the district with high percentage of area under H.Y.V. paddy. The impact of early adoption and diffusion of H.Y.V. seed technology in those districts has been reflected in the rise in demand for labour leading to an

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+ Labour productivity for 1981 instead of 1978 and Scheduled Castes and Scheduled tribes population (in %) for 1971 and 1981 are used. Estimated figures of agricultural labourers are used.

increase in agricultural wage rate therein. Consequently, labourers would have moved to those districts.

Impact of Human Resource Development and Infrastructure on Agricultural Wage Rate:

Finally, efforts are made to examine the impact of human resource development and available infrastructure facilities on agricultural wage rate. The latter has been hypothesized to be positively influenced by the former. The impact of human resource development and infrastructure facilities have been assessed separately on agricultural wage rate by using cross section data. Agricultural wage rates data pertain to 13 districts of Orissa State separately for the years, 1973 and 1978, and the composite indices for human resource development and infrastructure facilities developed in Chapter II are used as proxy for the level of human resource development and infrastructure facilities for the above years. In spite of the time gap between the indicators of human resource development and infrastructure facilities, on the hand and agricultural wage rates on the other, the present exercise would be sufficient to give broad indication regarding the impact of the former on the latter. In addition, attempt is made to examine the effects of each of the indicators of human resource development and infrastructure facilities on agricultural wage rate. Logically, each of the indicators is expected to have a direct relationship with agricultural wage rate. Simple correlation analysis is used to assess the hypotheses.

(a) Effects of Human Resource Development on Agricultural Wage Rate.

In determining the impact of human resource development on agricultural wage rate, correlation between each of human resource development index and its indicators are worked out. The correlation coefficients for the years, 1973 and 1978 are presented in Table V-12. The table indicates that human resource development index and each of its indicators except the proxy variables like schools (in both the years) and public health institutions (in 1978) in terms of population are positively correlated with agricultural wage rate. However in 1973, all the correlation coefficient are found to be nonsignificant. The nonsignificant relationship is probably the consequence of the inadequately available developed human resource which is not able to bring about technological breakthrough and to raise labour productivity in agriculture, and therefore, agricultural wage rate has not been significantly affected. If agricultural wage statistics for 1978 would be dependable, then we can say that the situation appears to have changed significantly in 1978. Agricultural wage rate is noticed to have been affected positively and significantly by the level of human resource development. The impact of a large number of indicators of human resource development on agricultural wage rate is seen to be positive and significant. The negative and non-significant relationship of each of the proxy variables namely schools and public health institutions

Table V- 12 :

Correlation between Agricultural Wage Rate and Each of Human Resource Development Index and its indicators.

Sl. No.	Human Resource Development Index and its Indices.	Agricultural Wage Rate 1973	1978
1	2	3	4
1.	Human Resource Development Index.	+.332	.569+
2.	Literacy percentage	+.440	.704++
3.	Students enrolled per 1000 population	+.295	.627+
4.	Teachers per lakh population	+.097	.219
5.	Schools per lakh Population (Pre & Middle)	-.045	-.346
6.	Schools per 100 Sq. Km. of Area. (Pre. & Middle)	+.192	.532+
7.	Hospitals, etc. per lakh Population	+.031	-.035
8.	Hospitals, etc., per 1000 Sq. Km. of area	+.283	.646++

++ Significant at 1 % level

+ Significant at 5 % level.

N.B.:- Table II-5 and Table II-6 may be referred for human reso development indix andits indicators.

per lakh population with agricultural wage rate does not appear to be unreasonable, since the farmers in Chapter II, are observed to be not effective in influencing agricultural productivity. Thus, human resource development appears to raise labour efficiency and per farm worker agricultural productivity and thereby, increasing agricultural wate. However, much depends upon the relaibility of data for agricultural wages in 1978.

(b) Impact of Available Infrastructure Facilities on Agricultural Wage Rates.

The impact of available infrastructure facilities on agricultural wage rates has been examined through correlation analysis. The correlation coefficient between each of infrastructure index and its indicators on the one hand, and agricultural wage rate on the other are given in Table V-13 separately for the years, 1973 and 1978. The table indicates that infrastructure index and each of its indicators except roads (in both the years), post offices (in both the years) and bank offices (in 1973) in terms of population are positively correlated with agricultural wage rate in both the years. However, in 1973 all the coefficients of correlation are seen to be nonsignificant. It has been observed in Chapter II that per farm worker agricultural productivity has not been significantly influenced by available infrastructure facilities in 1973. Thus their impact is separately seen to be nonsignificant (though positive) on the agricultural wage rate in that year.

Table V-13:

Correlation between Agricultural Wage Rate and each of Infrastructure Index and Its Indicators for 1973 and 1978.

Sl. No.	Infrastructure Index and Its indicators	Agricultural Wage Rate 1973	1978
1	2	3	4
1.	Infrastructure Index	.405	.792++
2.	Road Length per 100 Sq.Km. of area.	.256	.630+
3.	Road Length per lakh Population.	-.118	-.268
4.	Villages electrified as % of total inhibitated villages	.211	+.702+
5.	Net irrigated areas as % of net area sown	.442	.353+
6.	Post Offices per 100 Sq. Km. of area.	.195	.394
7.	Post Offices per lakh population.	-.022	-.113
8.	Bank Offices per lakh population.	-.117	.378
9.	Bank Offices per 1000 Sq.Km. of area.	.512	.863+
10.	Veterinary hospitals and dispensaties per 1000 Sq. Km. of area.	.334	.640+
11.	Passenger Vehicles registered per Lakh population.	.227	.739+
12.	Broadcasting Receiver licences per lakh population.	.109	.100

++ Singificant at 1% level.
+ Significant at 5% level.

N.B.:- Table II-7 and Table II-8 may be referred for Infrastructure Index and its indicators.

However, in 1978 the correlation of each infrastructure index and quite a good number of its indicators with agricultural wage rate are seen to be statistically significant. Previously, it has been observed that agricultural labour productivity is positively and significantly affected by infrastructure facilities and therefore, agricultural wage rate is seen to be favourably affected by the level of infrastructure facilities in 1978. The indicators expressed in terms of population have been seen to be ineffective in the process of rural development and therefore, road length and post offices in terms of population are seen to have negative effects on agricultural wage rate. However, their coefficients are non-significant. The validity of the conclusions (For 1978 agricultural wages) in fact, is subject to the relaibility of agricultural wage statistics for 1978.